Claims

1. Noise reduction arrangement comprising:

- a plurality of actuators (3(n)) for generating secondary noise (p_s) to reduce primary noise (p_p) generated by at least one primary source (4);
- a plurality of sensors (2(m)) for sensing the total amount of noise resulting from the primary noise after being reduced by the secondary noise and for generating a plurality of sensor signals (p(m));
- control means (5a(i), 5b(i)) for controlling the actuators (3(n)) based on the sensor signals (p(m)),

the distance (d) between the plurality of actuators (3(n)) and the plurality of sensors (2(m)) being selected to have an optimised reduction in power RP of the total amount of noise relative to the primary noise within a predetermined frequency band,

characterised in that

- the plurality of actuators (3(n)) are located in a first two dimensional array in a first surface;
- the plurality of sensors (2(m)) are located in a second two dimensional array in a second surface arranged substantially parallel to the first surface;
- the plurality of actuators (3(n)) are sub-divided into a plurality of sub-sets of actuators (3(n));
- the control means (5a(i), 5b(i)) comprise a plurality of controllers (5a(i), 5b(i)), each controller (5a(i), 5b(i)) being arranged to receive sensor signals of a sub-set of said plurality of sensors (2(m)) and arranged to control one single sub-set of actuators (3(n)); and
- said first and second surfaces are arranged at such a mutual distance that the reduction of power RP is within the following range:

$$0.9 \times RP_{max} \leq RP \leq RP_{max}$$

in which RP_{max} is maximum obtainable reduction in power of the total amount of noise relative to the primary noise at an optimum distance between said first and second surfaces as established by testing, where both RP and RP_{max} are expressed in decibel, the plurality of actuators being arranged in rows and columns, mutual distances between adjacent columns and mutual distances between adjacent rows being equal to a predetermined actuator distance d_x, the plurality of sensors being arranged in the same way as the plurality of actuators, the distance d between the first and the second

surfaces meeting the following condition:

$$0.5 \times d_x \leq d \leq d_x$$

2. Arrangement according to claim 1, wherein each controller (5a(i), 5b(i) is arranged to receive sensor signals of only those sensors (2(m)) which are within a predetermined range from said controller (5a(i), 5b(i)).

3. Arrangement according to claim 1 or 2, wherein the number of sensors (2(m)) equals the number of actuators (3(n)) and equals the number of controllers (5a(i), 5b(i)), each controller (5a(i), 5b(i)) receiving one of the plurality of sensor signals (p(m)) as input signal and controlling one of the plurality of actuators (3(n)).

4. Arrangement to any of the preceding claims wherein a sound reflective wall (8) is present such that the second surface is between the first surface and the wall (8).

5. Arrangement according to any of the preceding claims wherein one or more detection sensors (7(r)) are arranged for sensing said primary source (4) and providing one or more detection sensor signals (V_{det}(i)) to said plurality of controllers (5a(i), 5b(i)).

6. Arrangement according to any of the preceding claims wherein a supervising controller (6) is provided to receive signals in dependence on said sensor signals (p(m)) and to monitor long-term behaviour of the arrangement by modifying control parameters of the controllers (5a(i), 5b(i)) in order to ensure overall stability of the arrangement based on a predetermined error criterion as to the sensor signals (p(m)).